

A Revision of the Japanese Species of the Genus *Ectropis* HÜBNER, with Descriptions of Two New Genera and One New Subspecies (Lepidoptera: Geometridae)

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The *Boarmia*-complex of the Palaearctic Region contains phylogenetically wide range of species. As some of them are extremely variable and/or similar, it is often very difficult to analyse them correctly. HAMPSON (1895) sank the genus *Ectropis* as a junior synonym of *Boarmia* TREITSCHKE together with other 26 genera. PROUT (1915), mainly following HAMPSON's treatment, attempted to subdivide Palaearctic *Boarmia* into 11 sections, one of which was *Ectropis*, based on external characters. McDUNNOUGH (1920) divided North American species, previously included in the one genus *Cleora* CURTIS, into 23 genera on the basis of his detailed study of the male structures. He considered the genus *Ectropis* more highly specialized than any other genera. WEHRLI (1943), in his study on Palaearctic *Boarmia*, treated PROUT's sections as subgenera and added nine new subgenera by relying on male antenna and the structure of male genitalia. INOUE has studied the Japanese representatives of *Boarmia*-complex since 1942. He raised WEHRLI's subgenera to the rank of genera and added some new genera. In regard to *Ectropis*, he transferred *petrosa* BUTLER to *Racotis* MOORE, erected a new genus *Rectropis* for *sinearia* GUENÉE, and described *E. albipunctata* as a new species. INOUE (1956; 1977) listed up eight species under the genus *Ectropis*, and he (1957; 1959) illustrated them in colour. I already described larvae of the eight species and discussed the relationships among them based on larval characters (SATO, 1979a, b).

In this paper, Japanese *Ectropis* will be restricted to a compact natural group by considering adult and larval characters, and as a result will be described two new genera for reception of heterogeneous species newly removed from *Ectropis* s. str.

Genus *Ectropis* HÜBNER, 1825; *bistortata* (GOEZE), *obliqua* PROUT, *excellens* (BUTLER), *aigneri* PROUT.

Genus *Paradarisa* WARREN, 1894: *consonaria* (HÜBNER).

Genus *Parectropis* **gen. nov.**: *extersaria japonica* **subsp. nov.**

Genus *Protalcis* **gen. nov.**: *concinata* (WILEMAN).

Genus *Abaciscus* BUTLER, 1889: *albipunctata* (INOUE).

Length of forewing is shown in the following sequence: range of measurements in the material examined from apex to center of mesoscutum, followed, in parentheses, by the number of specimens measured and then by mean of measurements taken. Specimens reared from larvae have been omitted.

Genus *Ectropis* HÜBNER

Ectropis HÜBNER, 1825, Verz. bek. Schmett., 316; MEYRICK, 1982, Trans. ent. Soc. Lond., **1892**: 104;

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PROUT, 1915, in SEITZ, *Macrolep.*, 4: 376 (as a section of *Boarmia*); McDUNNOUGH, 1920, *Bull. Dep. Agric. Can. ent.*, 18: 35; WEHRLI, 1943, in SEITZ, *Macrolep.*, Suppl. 4: 532 (as a subgenus of *Boarmia*); INOUE, 1956, *Check List Lep. Jap.*, 3: 330; INOUE, 1977, *Bull. Fac. domestic Sci., Otsuma Woman's Univ.*, 13: 300. Type-species: *Geometra crepuscularia* DENIS et SCHIFFERMÜLLER.
Tephrosia BOISDUVAL, 1840, *Ind. Meth.* 198; GUENÉE, 1857, *Spec. Gen. Phal.* 9: 258. Type-species: *Geometra crepuscularia* DENIS et SCHIFFERMÜLLER.

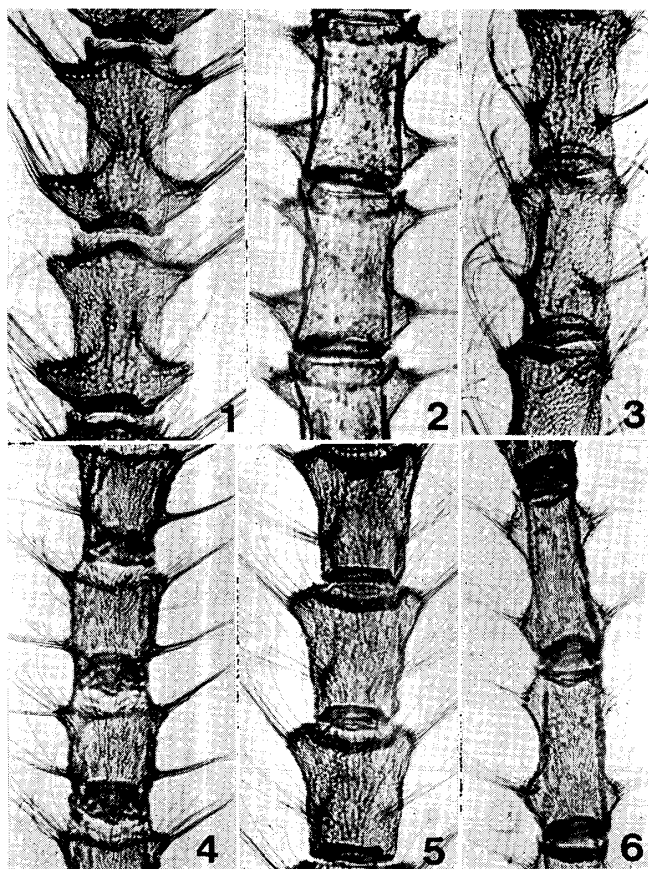
My close examination on adult and larval characters has led me to the conclusion that the use of *Ectropis* should be restricted to *crepuscularia* and its allies.

The genus *Ectropis* will be defined by the following combination of characters.

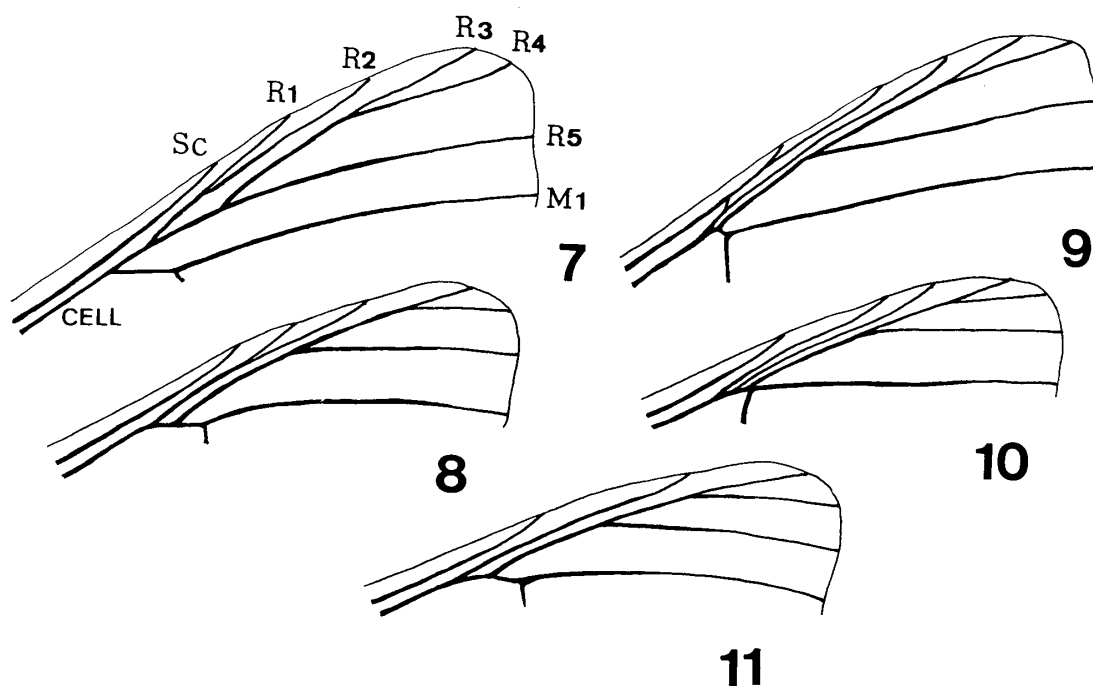
Male. Antenna fasciculate, with two pairs of fascicles on each segment (Figs. 1, 2). Abdomen not hairy below. Forewing with a fovea, but in some species it is weakly developed; veins R_1 and R_2 stalked, arising from before upper angle of cell, or from R_3 a short distance beyond it; R_1 and Sc separate; R_2 frequently anastomosing with R_3 to form an areole (Figs. 7, 8).

Female. Antenna ciliate. Forewing without fovea; veins R_1 and R_2 entirely coincident, rarely long-stalked with R_2 .

Male genitalia (Figs. 46–50). Uncus long and slender, pointed at tip. Gnathos absent or weakly developed. Valva long and narrow without armature; costa smoothly sclerotized, narrow, extending two-thirds of length of costal margin. Juxta with



Figs. 1–6. Male antenna. 1. *Ectropis bistortata* (GOEZE), Form A. 2. *E. excellens* (BUTLER). 3. *Paradarisa consonaria* (HÜBNER). 4. *Parectropis extersaria japonica* ssp. nov. 5. *Abaciscus albipunctata* (INOUE). 6. *Protalcis concinnata* (WILEMAN).



Figs. 7–11. Venation of forewing. 7. *Ectropis bistortata* (GOEZE). 8. *E. obliqua* PROUT. 9. *Paradarisa consonaria* ((HÜBNER). 10. *Parectropis extersaria japonica* ssp. nov. 11. *Protalcis concinnata* (WILEMAN).

broad base, sharply narrowing medially, then becoming wider anteriorly. Aedeagus long and slender, apical portion with minute spines sparsely; vesica with a single thorn-like cornutus.

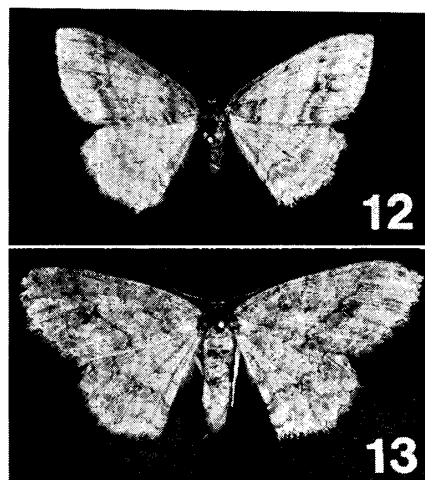
Female genitalia (Figs. 57–61). Ovipositor very long, retractile. Lamella antevaginalis with a pair of triangular, wing-like, lateral extension. Lamella post-vaginalis small, semi-circular. Ostium bursae membranous, but sclerotized in one species. Colliculum short. Ductus seminalis arising from near posterior end of ductus bursae. Bursa copulatrix globular with a single stellate signum. Ninth abdominal segment thickly clothed with long hairs (Fig. 63).

First instar larva. Pigmental pattern distinct from other genera, tentatively named “Ectropis-type”, as follows: head black, body greyish black with many white spots. Extra seta, termed SDX1 by MCGUFFIN (1977), present on the first five abdominal segments.

Mature larva. Head rugulose, slightly concave in frontal aspect; vertex weakly angulate. Cuticle smooth. Extra seta SDX1 present between D1 and SD1 on the first five abdominal segments; seta L2 on 1st abdominal segment (A1) directly below or slightly anterior to spiracle (SATO, 1979a).

Key to Species Based on External Characters

1. A dark blotch of forewing large, usually present..... 2
- A dark blotch of forewing absent or faintly appeared..... 3
2. Wings tinged with reddish brown; in male fovea well-developed, A3 without cluster of spines, hind tibia without hair-pencil..... *aigneri*



Figs. 12–13. Type specimens of *Ectropis* spp. 12. *Ectropis grisescens* ab. *obliqua* WARREN, 1894, holotype ♀, Hokodate. 13. *E. grisescens* WARREN, 1894, syn-type ♀, Ningpo, China. Both preserved in the British Museum (Natural History) collection, London. Photographs by Mr. D. S. FLETCHER.

- Wings not tinged with reddish brown; in male fovea less-developed, A3 with cluster of spines, hind tibia with hair-pencil.....*excellens*
- 3. Antemedial line straight; veins R_1+R_2 arising from cell, rarely from R_3 ; in male fovea less-developed, A3 with cluster of spines, hind tibia with hair-pencil *obliqua*
- Antemedial line excurved; veins R_1+R_2 arising from R_3 , rarely from cell; in male fovea well-developed, A3 without cluster of spines, hind tibia without hair-pencil 4
- 4. Wings grey or greyish brown, lightly irrorated with brown; postmedial line undulated; larger in size.....*bistortata* (Form A)
- Wings much darker, densely irrorated with fuscous; postmedial line straight; smaller in size.....*bistortata* (Form B)

Key to Species Based on Genitalia

- 1. Male..... 2
- Female..... 5
- 2. Gnathos weakly developed.....*aigneri*
- Gnathos absent..... 3
- 3. Juxta with a pair of elongate dorsal extensions.....*excellens*
- Juxta without such extensions..... 4
- 4. Cornutus about one-fifth length of aedeagus.....*obliqua*
- Cornutus about one-sixth length of aedeagus.....*bistortata*
- 5. Ostium bursae sclerotized.....*aigneri*
- Ostium bursae membranous..... 6
- 6. Colliculum as long as wide.....*excellens*
- Colliculum longer than wide..... 7

7. Ostium bursae shorter, about 1.5 times as long as the medial length of lamella postvaginalis..... *obliqua*
 — Ostium bursae longer, about twice as long as the medial length of lamella postvaginalis..... *bistortata*

***Ectropis bistortata* (GOEZE)**

(Figs. 17–19)

Phalaena bistortata GOEZE, 1781, Ent. Beytr., 3: 438.

Geometra biundularia BORKHAUSEN, 1794, Naturgesch. europ. Schmett., 5: 162.

Tephrosia biundularia: LEECH, 1897, Ann. Mag. nat. Hist. (6), 19: 337.

Boarmia crepuscularia: STAUDINGER, 1901, Cat. Lep. Pal. (ed. 3), 1: 342.

Boarmia (Tephrosia) crepuscularia: MATSUMURA, 1905, Cat. Ins. Jap., 1: 162.

Boarmia bistortata: PROUT, 1915, in SEITZ, Macrolep., 4: 377, pl. 21: g.

Ectropis bistortata: PROUT, 1930, Novit. zool., 35: 332; INOUE, 1956, Check List Lep. Jap., 3: 330;

INOUE, 1957, in Icones Het. Jap. Col. Nat., [1]: 262, pl. 53: 1376, 1377; INOUE, 1959, in Icon. Ins. Jap. Col. Nat. Ed., 1: 213, pl. 150: 1; INOUE, 1977, Bull. Fac. domestic Sci., Otsuma Woman's Univ., 13: 300.

Boarmia (Ectropis) bistortata: WEHRLI, 1943, in SEITZ, Macrolep., Suppl., 4: 534.

Ectropis obliqua: INOUE, 1957, in Icones Het. Jap. Col. Nat., [1]: 263, pl. 53: 1384 (part., nec PROUT, 1930).

In my previous paper (SATO, 1979a), I described two larval forms of this species, Form A and Form B, which are readily distinguished from each other by structure and host plant. Form A is polyphagous on many trees, including conifers, while Form B has been discovered only from *Cryptomeria japonica* (Taxodiaceae). In larval characters Form B is different from Form A mainly as follows; labral emargination much shallower (0.2, while in Form A 0.4); mandible with a distinct lateral tooth, while in Form A it is absent; body strongly tinged with yellow, with better defined pattern. Shallow labral emargination clearly suggests that Form B is a conifer feeder. In adult characters there are slight differences in appearance and structure of genitalia, but they are not constant for separation of two forms. Further examinations especially in regards to their reproductive isolation are necessary in order to determine whether they belong to a single or two species.

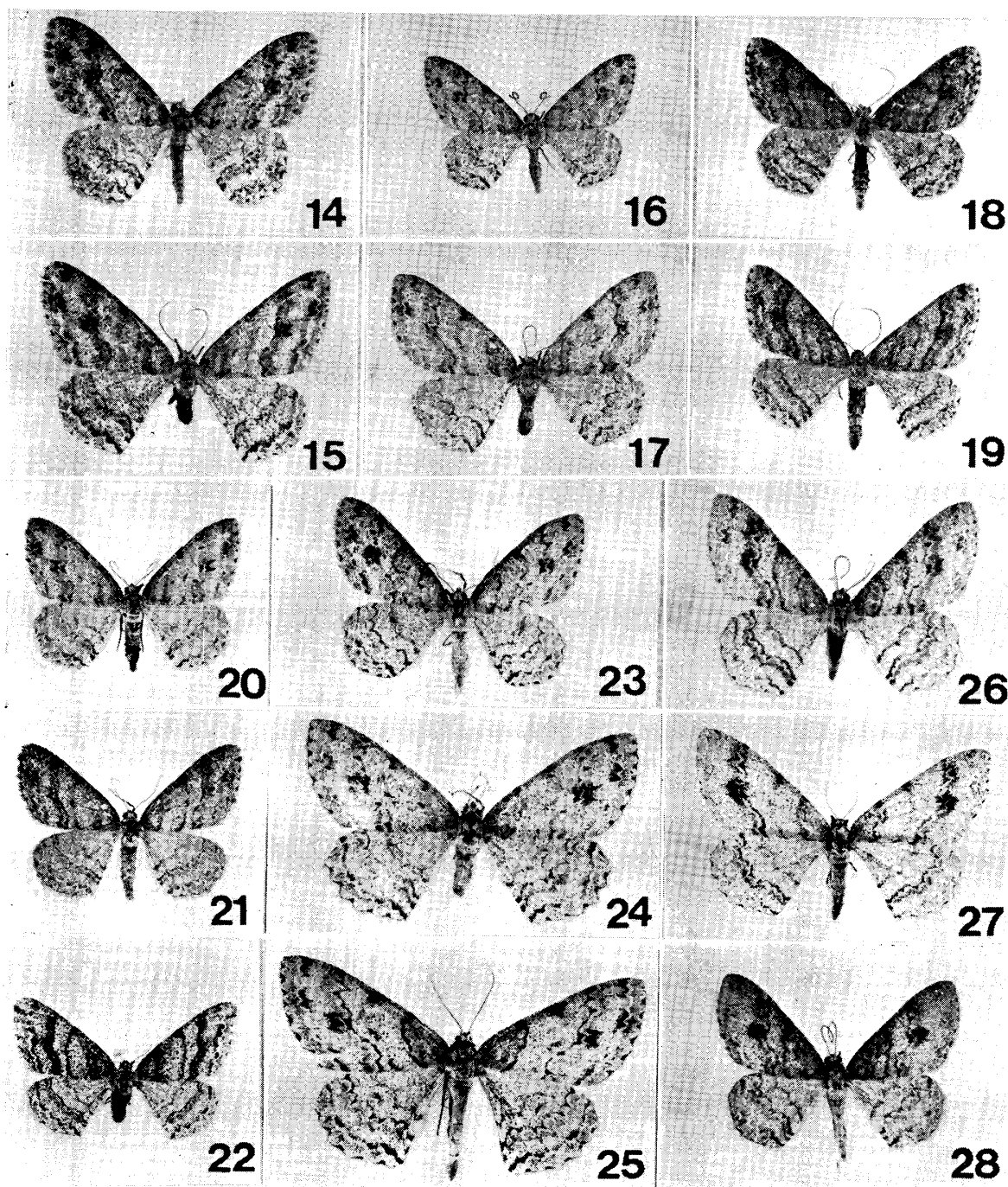
In male fovea well-developed; veins R_1+R_2 arising from R_3 a short distance beyond cell, rarely from it (Fig. 7); third abdominal sternite without cluster of spines; hind tibia without hair-pencil. Form A (Figs. 14–17): very variable in colour; in the commonest form ground colour grey or greyish brown, lightly irrorated with brown; forewing with postmedial line strongly incurved between veins Cu_2 and $2A$, a dark blotch distally to the middle of postmedial line faintly appeared or absent; hindwing with postmedial line excurved between veins M_3 and Cu_1 , then swung basally in large arc to anal vein. Form B (Figs. 18–19): confusingly similar to Form A, but in most specimens appreciably differs from it as follows; ground colour less variable, much darker, densely irrorated with fuscous; forewing with antemedial and postmedial lines often obsolescent, each represented by a series of black spots or dashes on veins, those on veins Cu_1 and M_3 usually conspicuous, postmedial line almost smooth between veins Cu_2 and $2A$, without dark blotch; hindwing with postmedial line almost smooth, even between veins Cu_1 and $2A$; smaller in size.

Length of forewing. Form A: vernal brood, ♂, 18–22 mm (68–20.2 mm), ♀, 19–23 mm (32–21.4 mm); aestival and autumnal brood, ♂, 16–19 mm (85–18.0 mm), ♀, 20–22 mm (41–20.0 mm). Form B: vernal brood, ♂, 18–20 mm (19–19.3 mm), ♀, 19–21 mm (6–19.7 mm); aestival brood, ♂, 15–18 mm (51–17.5 mm), ♀, 18–21 mm (15–19.5 mm).

Male genitalia (Figs. 46–47). Gnathos entirely absent; juxta narrow medially; a single cornutus about one-sixth length of aedeagus, about 1.5 times as long as its widest part. Generally in Form B medial portion of juxta wider than in Form A.

Female genitalia (Figs. 57–58). Ostium bursae membranous, about twice as long as medial length of lamella postvaginalis; colliculum longer than broad, narrower than width of lamella postvaginalis, tapered anteriorly. Generally in Form B signum slightly smaller than in Form A.

Material examined. Form A. 195 ♂, 89 ♀. Hokkaido—Tentoan, Abashiri (viii); Tennyogahara, 1380 m, Mt. Daisetsu (vii); Fukiage Spa, 1020 m, Mt. Tokachi (vi); Shibeche, Kushiro (v, vi); Kamicharo, Shiranuka, Kushiro (viii); Nukabira, Tokachi (iv, v, vi); Shimizu, Tokachi (viii); Horonai, Atsuma, Iburi (v, vi); Ikuta, Mukawa, Iburi (vi); Niwa, Hobetsu, Iburi (vi); Yunosawa, Hayakita, Iburi (viii); Yûbaridake-Hütte (viii); Bibai (viii); Futamata Spa, Oshamanbe, Toshima (viii); Nigorikawa Spa, Mori, Toshima (viii); Hakodateyama (vi); Momijiyamacho, Hakodate (v). Honshu—Iwate Pref.: Tôshichi, Hachimantai (v). Akita Pref.: Nibetsu, Akita City (ix); Sumikawa, Hachimantai (viii). Gunma Pref.: Doaiguchi (iv); Mt. Mikaboyama (iv); Kumanotaira (vii); Niiharu-mura (vii). Saitama Pref.: Mt. Mitsumine (v). Tokyo: Nippara (iii). Kanagawa Pref.: Nishitanzawa (vi). Niigata Pref.: Miomote (v, vi, ix); Tainai (iv, vi, viii); Koara, Kanose (viii); Akadani (vi, ix); Mt. Mt. Kakuda (iv, v, vii); Mt. Yahiko (iii, iv, vi, vii, ix); Haige, Nagaoka (vii); Tochio (viii); Mt. Omine (iv, ix); Mikuni Pass, Yuzawa (vi, viii, ix); Sakasamaki (vii); Akakura (viii); Tsubame (vi, vii); Kuzuha Pass, Itoigawa (v); Mt. Myôken, Is. Sado (v, vii); Mt. Koshiba, Is. Awashima (viii). Ishikawa Pref.: Chûgû Spa (iv, vii); Ozou (vii); Kutani (vi); Suginomizu Pass (vi). Yamanashi Pref.: Momonoki Spa (vi); Fukashiro (iv); Sanjô, Tabayama (iv). Nagano Pref.: Nagamine, Saku (iv); Yunomaru (vii); Yamaguchi, Ueda (v); Ueda Park (iv, vii, viii, ix, x); Shirohebi-jinja, Ueda (iv); Sugadaira (vii); Nobeyama, Minamimaki (vii). Gifu Pref.: Kamigabora (v); Ugo (iv); Hindani (v); Shiratani (iv); Ojino (iii); Harayama (viii); Fujihashi (vii); Yoro Park (iii, iv); Neo (iv). Mie Pref.: Hirakura (iv, v); Yunoyama (iv, v); Shiraki (iv); Takiyama (iii, iv); Sekisuikei (vii); Mt. Gozaisho (vi, vii). Osaka: Kabusan-ji, Takatsuki City (iv). Hyôgo Pref.: Onzui (vii, viii); Mt. Mikusayama (iv); Sekinomiya (viii). Wakayama Pref.: Ôsugidani (vii). Okayama Pref.: Yubune (vii). Shikoku—Ehime Pref.: Tsuchigoya, Mt. Ishizuchi (iv). Kyushu—Kumamoto Pref.: Nigô (v, viii). Miyazaki Pref.: Mt. Osuzu (vi). Kagoshima Pref.: Takakumayama (iv). Is. Tsushima—Mt. Ariakeyama (vii); Kamisaka Park (vii); Sumo (vii); Mt. Ôboshiyama (vii); Mt. Mokkoku (vi); Douzaka (vii); Mt. Kôraisan (vii). Is. Yakushima—Kosugidani (viii). Form B. 87 ♂, 27 ♀. Honshu—Niigata Pref.: Mt. Kakuda, Maki, 23 ♂, 6 ♀ (iv, v, vii); loc. cit., 15 ♂, 16 ♀, ex larvae (vii, emerged); Haige, Nagaoka, 18 ♂ (v, vii); loc. cit., 1 ♂, ex larva (x, emerged); Goka Pass, Maki 2 ♂ (vii); Tochio, 1 ♀ (vii); Kôridon-no-ike, Ojiya City, 1 ♂ (viii); Shimizu, Shiozawa, 1 ♂ (viii); Kawarazawa,



Figs. 14–28. *Ectropis* spp. 14–17. *E. bistortata* (GÖEZE), Form A. 14. ♂, Mt. Ōmine, Niigata (iv); 15. ♀, Is. Sado (v); 16. ♂, Tainai, Niigata (vi); 17. ♀, Sakasamaki, Niigata (vii). 18–19. *E. bistortata* (GÖEZE), Form B. 18. ♂; 19. ♀, Mt. Kakuda, Niigata (vii). 20–22. *E. obliqua* PROUT. 20. ♂, Haige, Niigata (v); 21. ♂, Azuma, Hokkaido (v); 22. ♀, Bibai, Hokkaido (v). 23–25. *E. excellens* (BUTLER). 23. ♂, Mugegawa, Gifu (iv); 24. ♀, Hindani, Gifu (v); 25. ♀, Yuzurio Shiga (vii). 26–28. *E. aigner* PROUT. 26. ♂, Sanjō, Yamaguchi (v); 27. ♀, Hindani, Gifu (v); 28. ♂, Ōsugidani, Wakayama (vii).

Muikamachi, 1 ♂, 1 ♀ (iv); Arigoyama, Muikamachi, 1 ♂ (iv). Nagano Pref.: Tôge-machi, Karuizawa, 1 ♀ (vi). Mie Pref.: Hirakura, Misugi, 1 ♂, 1 ♀ (v). Wakayama Pref.: Ôsugidani, 6 ♂, 1 ♀ (vii); Gôgawa, 5 ♂ (viii); Komori, 12 ♂, 1 ♀ (viii). Is. Yakushima: Kosugidani, 1 ♂ (iv).

In my collection there are some specimens which have been left unidentified as to Forms.

Distribution. Hokkaido, Honshu, Shikoku, Kyushu, Tsushima, Yakushima, Okinawa, Ishigakijima, Iriomotejima; Korea, Manchuria, E. Siberia, Transcaucasia, Europe.

Food plants. Form A: polyphagous on about 30 species of plants. Form B: *Cryptomeria japonica* (Taxodiaceae). Bivoltine or trivoltine according to locality. Hibernation in pupal stage.

Remarks. Very closely related to *crepuscularia* (DENIS et SCHIFFERMÜLLER) from Europe in superficial appearance and structure of genitalia. In England *bistortata* and *crepuscularia* can be separated by colour and dates of their emergence; the former emerges in March and early April, with a second generation in late June and July, while the latter flies in May and June, with occasional second generation in August (SOUTH, 1961). I have examined some Japanese specimens similar to *crepuscularia* in colour, but I am inclined to treat them as belonging to the present species.

Ectropis obliqua PROUT

(Figs. 20–22)

Ectropis grisescens ab. *obliqua* WARREN, 1894, Novit. zool., 1: 434.

Tephrosia grisescens: LEECH, 1897, Ann. Mag. nat. Hist., (6), 19: 338 (nec. WARREN).

Boarmia (*Tephrosia*) *grisescens*: MATSUMURA, 1905, Cat. Ins. Jap., 1: 162.

Ectropis grisescens: WILEMAN, 1911, Trans. ent. Soc. Lond., 1911: 317.

Boarmia grisescens obliqua: PROUT, 1915, in SEITZ, Macrolep., 4: 377.

Ectropis obliqua PROUT, 1930, Novit. zool., 35: 333; INOUE, 1956, Check List Lep. Jap., 3: 331, INOUE, 1957, in Icones Het. Jap. Col. Nat., [1]: 263, pl. 53: 1382, 1383; INOUE, 1959, in Icon. Ins. Jap. Col. Nat. Ed., 1: 213, pl. 150: 2; INOUE, 1977, Bull. Fac. domestic Sci., Otsuma Woman's Univ., 13: 300.

Boarmia (*Ectropis*) *obliqua*: WEHRLI, 1943, in SEITZ, Macrolep., Suupl. 4: 536, pl. 45: i.

Similar to *bistoreata* in appearance, but differing from it mainly as follows. Much smaller, the smallest in Japanese *Ectropis*. In male fovea less developed; veins $R_1 + R_2$ arising from cell, rarely from R_3 (Fig. 8); third abdominal sternite with cluster of spines; hind tibia with hair-pencil. Variable in colour, in most specimens ground colour yellowish brown, not tinged with red; in general Hokkaido population whitish and paler than Honshu specimens. Forewing: broader; antemedial line almost smooth; postmedial line straight or weakly incurved between veins Cu_2 and $2A$; a dark blotch absent or obsolescent or represented as two black dashes on veins Cu_1 and M_3 . Hindwing: postmedial line nearly straight.

Length of forewing. Vernal brood, ♂, 15–18 mm (26–16.1 mm), ♀, 17–19 mm (4–18.0 mm); aestival and autumnal brood, ♂, 13–15 mm (18–14.3 mm), ♀, 15–16 mm (5–15.2 mm).

Male genitalia (Fig. 48). Similar to *bistortata*, different from it as follows: cornutus slightly longer, about one-fifth length of aedeagus.

Female genitalia (Fig. 59). Similar to *bistortata*, different from it as follows: ostium bursae shorter, about 1.5 times as long as median length of lamella postvaginalis; ductus bursae longer and slenderer.

Material examined. 49 ♂, 19 ♀. Hokkaido—Tentoan, Abashiri (viii); Shibe-cha, Kushiro (v, vi); Horonai, Atsuma, Iburi (vi); Mukawa (Ikuta, Ariake), Iburi (vi); Niwa, Hobetsu, Iburi (vi); Hayakita (Yunosawa, Mizuho, Tomioka, Takunan), Iburi (v, vi, viii); Maruyama, Kuriyama, Ishikari (v); Bibai (viii); Maruyama Park, Sapporo (viii). Honshu—Gunma Pref.: Kumanotaira (iv, vii). Saitama Pref.: Ôwa (iv). Niigata Pref.: Minomote (viii); Tainai (v); Shimotsunagi, Mikawa (vi); Akadani (vi, viii, ix); Mt. Kakuda (v, viii); Haige, Nagaoka (v, viii, ix); Mt. Ômine (viii); Sakasamaki (vii, viii); Muikamachi (iv); Kanayasan (v); Ikenotaira (vii); Tsubame (vii); Tassha, Is. Sado (vii); Nyûgawa, Is. Sado (v); Mt. Koshiba, Is. Awashima (viii). Yamanashi Pref.: Uenohara (v). Nagano Pref.: Karuizawa (vii); Yamaguchi, Ueda (v); Shirohebijinja, Ueda (iv). Gifu Pref.: Hindani (v); Ojino (iv); Harayama (viii). Mie Pref.: Takihara (vii). Osaka: Ryûsenkyo (viii). Shimane Pref.: Tsuwano (viii). Shikoku—Kagawa Pref.: Kashiwara (vii). Is. Tsushima—Gaya (iv, v).

Distribution. Hokkaido, Honshu, Shikoku, Kyushu, Tsushima.

Food plants. Polyphagous on trees and herbs of nearly 30 species. Bivoltine, partly trivoltine. Hibernation in pupal stage.

Remarks. This species had been considered as an aberrant form or a race of *grisescens* WARREN, 1894, *Novit. zool.*, 1: 434, until PROUT (1930) made it a good species. Warren's *obliqua*, originally established as an aberrant form, has no status by the Code of Zoological Nomenclature. Mr. D. S. FLETCHER kindly compared Japanese specimens (1 ♂, 2 ♀) with the holotype of this species (Fig. 12) from Hakodate and the syntype of *grisescens* (Fig. 13) from Ningpo in China, and confirmed for me that they are exactly conspecific with this species. In his letter dated October 26, 1979, Mr. FLETCHER wrote me that *E. grisescens* is very much larger and darker than this species and is currently a senior subjective synonym of *E. terrestris* SWINHOE, 1902, *Trans. ent. Soc. Lond.* 1902: 622, from Hong Kong.

Ectropis excellens (BUTLER)

(Figs. 23–25)

Tephrosia excellens BUTLER, 1884, *Ann. Mag. nat. Hist.*, (5), 13: 275.

Boarmia biundularia var? *incertaria* STAUDINGER, 1897, *Dt. ent. Z.*, *Iris*, 10: 59, pl. 2: 80.

Tephrosia biundularia: LEECH, 1897, *Ann. Mag. nat. Hist.*, (6), 19: 337 (nec. BORKHAUSEN).

Boarmia excellens: STAUDINGER, 1901, *Cat. Lep. Pal.* (ed. 3), 1: 343; MATSUMURA, 1905, *Cat. Ins. Jap.*, 1: 162; PROUT, 1915, in SEITZ, *Macrolep.*, 4: 378, pl. 21: h.

Ectropis excellens: PROUT, 1930, *Novit. zool.*, 35: 333; INOUE, 1956, *Check List Lep. Jap.*, 3: 331; INOUE, 1957, in *Icones Het. Jap. Col. Nat.*, [1]: 262, pl. 53: 1380, 1381; INOUE, 1959, in *Icon. Ins. Jap. Col. Nat. Ed.*, 1: 213, pl. 150: 4; INOUE, 1977, *Bull. Fac. domestic Sci., Otsuma Woman's Univ.*, 13: 300.

Boarmia (Ectropis) excellens: WEHRLE, 1943, in SEITZ, *Macrolep.*, *Suppl.* 4: 536.

Similar to *bistortata* in colour and maculations, but readily distinguished from it as follows. Much larger. In male fovea less developed; veins R_1+R_2 arising from cell, sometimes from R_3 ; third abdominal sternite with cluster of spines; hind tibia with hair-pencil. Variable in colour partly individually and partly geographically.

Ground colour varies from light grey to pale brown, not tinged with red. Forewing: postmedial line more dentate, a dark blotch well developed.

Length of forewing. Vernal brood, ♂, 18–23 mm (75–22.0 mm), ♀, 24–27 mm (10–25.4 mm); aestival and autumnal brood, ♂, 16–23 mm (146–19.1 mm), ♀, 23–27 mm (15–25.0 mm).

Male genitalia (Fig. 49). Gnathos absent; juxta with posterior portion much shorter, having a pair of elongate dorsal extensions, with very narrow medial portion; a cornutus about two-fifth length of aedeagus, about 2.5 times as long as its widest part.

Female genitalia (Fig. 61). Ostium bursae membranous, shorter than the median length of lamella postvaginalis; colliculum broad, length equal to width, almost as wide as the width of lamella postvaginalis.

Material examined. 243 ♂, 35 ♀. Hokkaido—Shibecha, Kushiro (vi, vii); Horonai, Atsuma, Iburi (vi); Mukawa (Ikuta, Ariake), Iburi (vi); Niwa, Hobetsu, Iburi (vi); Akagawa, Hakodate (vi); Hakodateyama (vi). Honshu—Iwate Pref.: Tenshōchi, Kitakami (v). Miyagi Pref.: Zaô-machi (vi). Niigata Pref.: Tainai (vi); Akadani (vi); Mt. Kakuda (iv, v, vii); Nika, Maki (v, viii); Maze (vii); Mt. Yahiko (v); Koara, Kanose (viii); Futai (viii); Sakasamaki (viii); Tsubame (vi, vii, viii); Mt. Akiba (v); Oginojô (viii); Ogi, Is. Sado (vi, viii). Ishikawa Pref.: Kutani (vi); Suginomizu Pass (vi). Yamanashi Pref.: Uenohara (v); Sanjô, Tabayama (v); Akiyama (v). Gifu Pref.: Hindani (v); Shiratani (v, vi); Amou Pass (vi); Mitahora, Gifu City (iv, vii); Fujihashi (vii); Yôro Park (iv, v, vii); Ijira-mura (viii); Nenogami Heights (vii). Mie Pref.: Hirakura (vi). Shiga Pref.: Yuzurio (vii, viii). Osaka: Ryûsenkyo (viii). Hyôgo Pref.: Onzui (viii, x); Sekinomiya (vii). Wakayama Pref.: Ôsugidani (vii), Gôgawa (viii); Komori (viii). Kyushu—Kumamoto Pref.: Ôkawachi (vi); Tategamikyô (viii). Izu Islands—Is. Toshima (v). Is. Niiijima: Honson (vi). Is. Kôzushima (v). Is. Miyakejima: Tsubota (vi, vii); Ako (vi); Kamitsuki (v). Is. Mikurajima: Kawada (vi). Is. Hachijôjima: Sueyoshi (v, vii). Is. Tsushima—Mt. Ariake (vii, x); Kamisaka Park (vii); Sumo (vii); Mt. Kôraisan (vii); Mt. Ôboshiyama (vii); Sasuna (viii); Kisaka (viii). Is. Yakushima—Miyannoura (iii); Suzukawa (viii); Kosugidani (viii); Kurio (iii, viii); Nagata (viii); Shitoko (iii, viii). Is. Amami-ôshima—Nishinakama (iii); Hatsuno (iii, viii); Mt. Yuwandake (iii, viii); Mt. Yuidake (iii, viii). Okinawa—Gogayama (iii); Ôgimi-son (viii). Is. Ishigakijima—Mt. Bannadake (iii). Is. Iriomotejima—Uebaru (viii).

Distribution. Hokkaido, Honshu, Shikoku, Kyushu, Tsushima, Yakushima, Amamiôshima, Okinawa, Kumejima, Ishigakijima, Iriomotejima; Korea, Ussuri, China.

Food plants. Polyphagous on about 40 different hosts, including conifer and monocotyledon. Bivoltine or trivoltine according to locality. Hibernation in pupal stage.

Remarks. Generally speaking northern specimens are paler than southern population. Izu Islands population tends to be tinged with ochreous. Yakushima, Amamiôshima and Ryukyu Islands populations are darker than mainland one. It is at present impossible for me to separate this variable species into two or more sub-species.

Ectropis aigner PROUT

(Figs. 26–28)

Ectropis aigner PROUT, 1930, Novit. zool., **35**: 332; INOUE, 1956, Check List. Lep. Jap., **3**: 331; INOUE, 1957, in Icones Het. Jap. Col. Nat., [1]: 262, pl. 53: 1378, 1379; INOUE, 1959, in Icon. Ins. Jap. Col. Nat. Ed., **1**: 213, pl. 150: 3; INOUE, 1977, Bull. Fac. domestic Sci., Otsuma Woman's Univ., **13**: 300.

Boarmia (Ectropis) aigner: WEHRLLI, 1943, in Seitz, Macrolep., Suppl. 4: 535, pl. 45: i.

Similar to *excellens* in appearance, but distinct from it by the following characters. In male fovea well-developed; veins $R_1 + R_2$ arising from cell, very rarely from R_3 ; third abdominal sternite without cluster of spines; hind tibia without hair-pencil. Ground colour less variable, grey with a tinge of reddish brown. Forewing: post-medial line more strongly incurved between Cu_2 and 2A, usually accompanied by reddish brown band distally.

Length of forewing. Vernal brood, ♂, 19–22 mm (32–21.2 mm), ♀, 23–26 mm (5–23.8 mm); aestival brood, ♂, 16–21 mm (38–18.5 mm), ♀, 21–26 mm (3–23.0 mm).

Male genitalia (Fig. 50). Uncus short, two-fifths of tegumen; gnathos present, but very narrow; juxta large, not very narrow medially, with a pair of long, well-sclerotized, dorsal extensions; cornutus about one-fourth length of aedeagus, about 1.5 times as long as its widest part.

Female genitalia (Fig. 60). Lamella postvaginalis smaller; ostium bursae sclerotized, about four times as long as the median length of lamella postvaginalis; colliculum narrow, length nearly equal to width.

Material examined. 75 ♂, 8 ♀. Hokkaido—Mizuho, Hayakita, Iburi (vi). Honshu—Akita Pref.: Tashiro tai, Kazuno (vii); Kumatoritai, Kazuno (vi); Nibetsu, Akita City (vi). Saitama Pref.: Ôwa (v). Tokyo: Nippara (vi); Mt. Takao (v). Niigata Pref.: Miomote (vi); Tsubame (vi, vii). Ishikawa Pref.: Chûgû Spa (vi). Yamanashi Pref.: Sanjô Tabayama (v); Momonoki Spa (vi). Nagano Pref.: Tôgemachi, Karuizawa (vi). Gifu Pref.: Hindani (v); Shiratani (v); Fujihashi (vii); Kabe (iv). Mie Pref.: Hirakura (v); Mt. Gozaisho (vii). Kyoto: Mt. Ooeyama (vii). Osaka: Ryûsenkyo (vii). Wakayama Pref.: Ôsugidani (vii). Hyôgo Pref.: Onzui (v, vii). Kyushu—Fukuoka Pref.: Mt. Hikosan (v).

Distribution. Hokkaido, Honshu, Shikoku, Kyushu (new record), Tsushima.

Food plants. Only three species of *Euptelea* (Trochodendraceae), *Cornus* (Cornaceae) and *Pterocarya* (Juglandaceae) have been recorded, but many other food plants will be added by further investigation. Bivoltine in warmer regions, but univoltine in colder regions. Hibernation in pupal stage.

Remarks. Male and female genitalia of this species are quite peculiar, being well discernible from the other species of the *Ectropis* dealt with in this paper.

Genus *Paradarisa* WARREN

Paradarisa WARREN, 1894, Novit. zool., **1**: 433. Type-species: *Boarmia comparataria* WALKER.

The genus *Paradarisa* was established by WARREN (1894) for the reception of *Boarmia comparataria* WALKER, 1866, *List lep. Ins. Brit. Mus.*, **35**: 1582, from N. W. Himalayas, in India. In Japan only one species, *P. chloauges kurosawai* INOUE, has

been known as a member of this genus (SATO, 1980).

Consonaria HÜBNER has long been placed in *Ectropis*, but my close examination of larval characters revealed that it should be transferred to other genus (SATO, 1979a). The structure of genitalia and other adult characters clearly show that it is a member of *Paradarisa*.

***Paradarisa consonaria* (HÜBNER) comb. nov.**

(Figs. 29–30)

Geometra consonaria HÜBNER, 1799, Samml. eur. Schmett, Beom., pl. 30: 157.

Ectropis consonaria: MEYRICK, 1892, Trans. ent. Soc. Lond., **1892**: 104; WILEMAN, 1911, Trans. ent. Soc. Lond., **1911**: 316; INOUE, 1956, Check List. Lep. Jap., **3**: 331; INOUE, 1957, in Icones Het. Jap. Col. Nat., [1]: 263, pl. 53: 1386, 1387; INOUE, 1959, in Icon. Ins. Jap. Col. Nat. Ed., **1**: 213, pl. 150: 6; INOUE, 1977, Bull. Fac. domestic Sci., Otsuma Woman's Univ., **13**: 300.

Boarmia consonaria: STAUDINGER, 1901, Cat. Lep. Pal. (ed. 3), **1**: 343; MATSUMURA, 1905, Cat. Ins. Jap., **1**: 161; PROUT, 1915, in Seitz, Macrolep., **4**: 378, pl. 21: h.

Boarmia (Ectropis) consonaria: WEHRLI, 1943, in SEITZ, Macrolep., Suppl. **4**: 537.

Antenna similar to *Ectropis*, but the shape of each segment different, as shown in figs, 1, 2 and 3. In male abdomen clothed with long hairs ventrally, but without tufts of long hairs as in *chloauges*; third abdominal sternite with cluster of spines; hind tibia with hair-pencil. Forewing with a fovea in male; vein R_1 arising from Sc, anastomosing with R_2 ; R_2 from cell, sometimes connected with R_3 and R_4 (Fig. 9).

Length of forewing. ♂, 16–21 mm (23–19.5 mm), ♀, 16–22 mm (33–19.8 mm).

Male genitalia (Fig. 51). Very similar to *comparataria*, but different from it as follows: process of sacculus much shorter; cornuti on vesica two sets, one thorn-like, and the other composed of about twenty spines as in *chloauges*.

Female genitalia (Fig. 62). Similar to *comparataria*, but distinct from it as follows: lamella postvaginalis more rounded as in *chloauges*; colliculum longer, length nearly equal to width; ductus bursae narrower, almost parallel-sided.

Material examined. 30 ♂, 33 ♀. Hokkaido—Shibecha, Kushiro (vi); Nukabira, Tokachi (vi, vii); Horonai, Atsuma, Iburi (v, vi); Tomioka, Hayakita, Iburi (vi); Kuriyama, Ishikari (v); Nakano, Hakodate (vi). Honshu—Gunma Pref.: Namesawa (vi). Tokyo: Nippara (vi); Mt. Takao (iv). Niigata Pref.: Miomote (v); Akadani (vi); Mt. Hakusan, Muramatsu (iv); Mt. Kakuda (v); Mt. Yahiko (iv); Mt. Atema (vi); Okutadami (v); Tsubame (vi). Yamanashi Pref.: Uenohara (v); Sanjô, Tabayama (v); Momonoki Spa (vi); Nagano Pref.: Yunomaru (vii); Tôgemachi, Karuizawa (vi); Todai, Hase, Kamiina (vii). Gifu Pref.: Hindani (v); Shiratani (v); Amou Pass (vi). Is. Tsushima—Mitake (iv).

Distribution. Hokkaido, Honshu, Shikoku, Tsushima; Korea, Saghalien, SE. Siberia, Europe.

First instar larva. Pigmental pattern, one of the important generic characters, different from “*Ectropis*-type”, as follows: head orange; subdorsal, subventral and ventral areas brown, contrasting with pallid dorsal and lateral areas. This pattern, tentatively named “*Boarmia*-type”, are widely found in boarmid larvae. Extra seta SDX1 absent.

Mature larvae. Head and body smooth; extra seta SDX1 absent; seta L2 on A1

well anterior to spiracle (SATO, 1979a).

Food plants. *Quercus* (Fagaceae), *Hamamelis* (Hamamelidaceae), *Sorbus* (Rosaceae), *Leucothoe* (Ericaceae). In Europe this species is found on *Quercus*, *Betula*, *Alnus*, *Carpinus*, *Fagus* etc. Polyphagous. Univoltine. Moths appear in spring. Hibernation in pupal stage.

***Parectropis* gen. nov.**

Type-species: *Geometra extersaria* HÜBNER.

Male. Front flat. Proboscis developed. Palpus porrect or slightly upturned, extending slightly beyond front. Antenna similar to *Ectropis*, but the shape of each segment different, as shown in figs. 1, 2 and 4. Third abdominal sternite without cluster of spines. Seventh and eighth abdominal sternite with tufts of long hairs ventrally, sometimes seventh one without them. Hind tibia with hair-pencil. Forewing with a fovea; vein Sc separate, R_1 and R_2 free, arising from before upper angle of cell (Fig. 10).

Female. Antenna ciliate. Abdomen not hairy ventrally. Hind tibial hair-pencil lacking. Forewing without fovea; venation similar to male.

Male genitalia (Figs. 52–54). Uncus short, stout, apex bluntly pointed. Gnathos developed, with posteriorly directed V-shaped median process. Valva slightly narrowed apicad, dorsal half covered with numerous fine setae; costa with tufts of long harpe fold in shape, with 8–10 short spines; saccus rounded. Juxta large without process. Aedeagus with many spines, a single cornutus long, ribbed and pointed, with large corrugated base.

Female genitalia (Figs. 64–68). Ovipositor short. Lamella postvaginalis heavily sclerotized, emitting caudad a projection of rounded apex. Ductus bursae heavily sclerotized, ribbed. A single signum, folded.

Extersaria HÜBNER has long been placed in *Ectropis*, but from larval characters I pointed out its distinction from the species of *Ectropis* (SATO, 1979a). This new genus is distinguished from *Ectropis* by the venation, tufts of long hair on abdominal sternite, as well as some remarkable structural differences in male and female genitalia. The following two species from Taiwan bear a striking similarity to *extersaria* in appearance and genital characters; *Ectropis leucosema* PROUT, 1914, *Ent. Mitt.* **3**: 267, and *E. nigrosparsa* WILEMAN et SOUTH, 1917, *Entom.* **50**: 54. They should be removed from *Ectropis* to this new genus in future.

***Parectropis extersaria japonica* subsp. nov.**

(Figs. 31–32)

Geometra extersaria HÜBNER, 1799, Samml. eur. Schmett., Geo., pl. 20: 159.

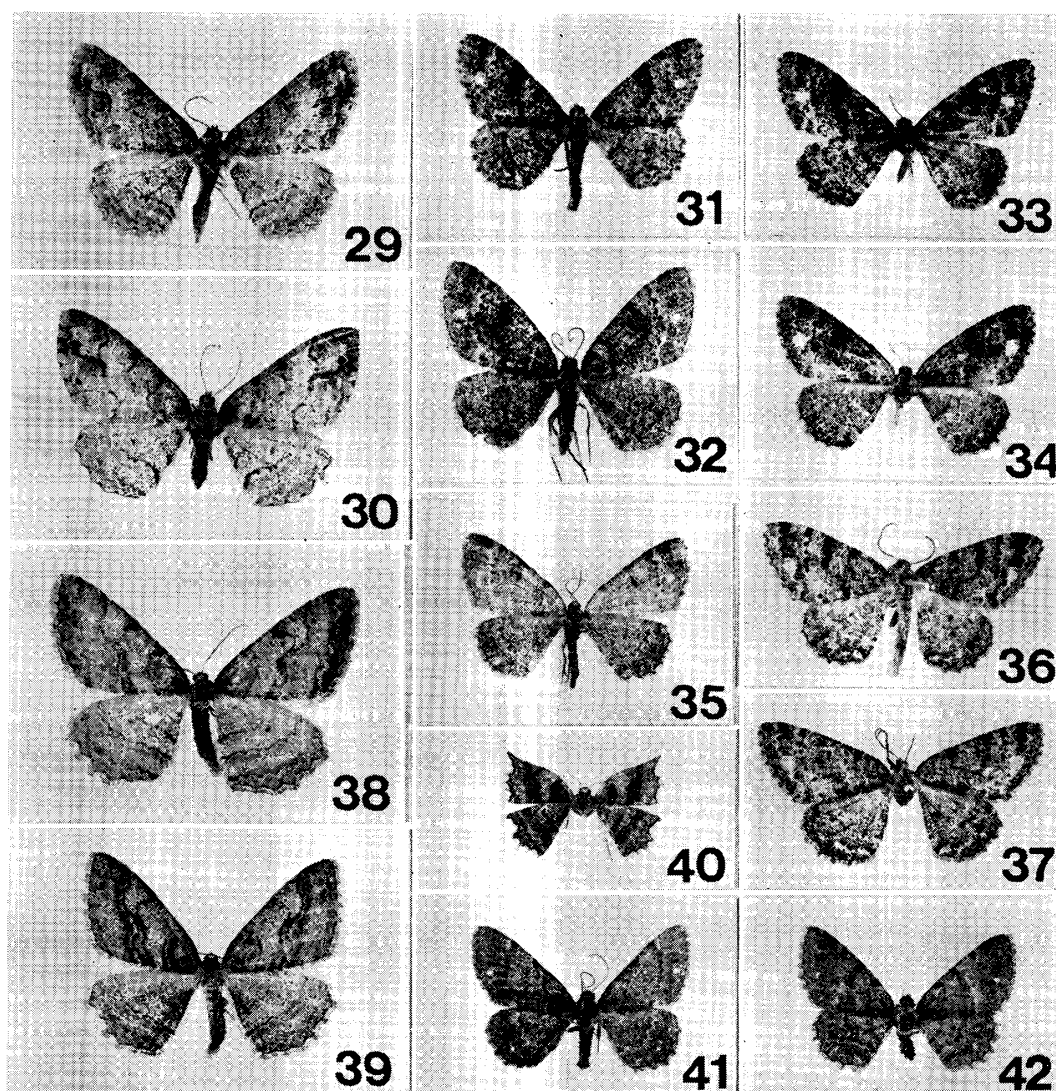
Tephrosia luridata: LEECH, 1897, Ann. Mag. nat. Hist., (6), **19**: 337.

Boarmia luridata var. *obscurior*: STAUDINGER, 1901, Cat. Lep. Pal. (ed. 3): 343 (part., nec STAUDINGER, 1897).

Boarmia (*Tephrosia*) *luridata* var. *obscurior*: MATSUMURA, 1905, Cat. Ins. Jap. **1**: 161.

Boarmia extersaria obscurior: PROUT, 1915, in SEITZ, Macrolep., **4**: 378 (part., nec STAUDINGER, 1897).

Ectropis extersaria obscurior: INOUE, 1956, Check List Lep. Jap., **3**: 332; INOUE, 1957, in Icones Het.



Figs. 29–30. *Paradarisa consonaria* (HÜBNER). 29. ♂, Mt. Hakusan, Niigata (iv); 30. ♀, Tsubame, Niigata (vi). Figs. 31–32. *Parectropis extersaria japonica* ssp. nov. 31. ♂, Tsubame, Niigata (vii), holotype; 32. ♀, Nibetsu, Akita (vi), paratype. Figs. 33–34. *P. extersaria obscurior* (STAUDINGER). 33. ♂; 34. ♀, Ussuri, USSR (vi). Fig. 35. *P. extersaria grisescens* (DJAKONOV). ♀, S. Siberia, USSR. Figs. 36–37. *E. extersaria extersaria* (HÜBNER). 36. ♂; 37. ♀, England. Figs. 38–40. *Protalcis concinnata* (WILEMAN). 38. ♂, Azuma, Hokkaido (v); 39. ♂, Uenohara, Yamanashi (iii); 40. ♀, Ueda, Nagano (iii). Figs. 41–42. *Abaciscus albipunctata* (INOUE). 41. ♂, Sanjô, Yamanashi (v); 42. ♀, Tsubame, Niigata (vii).

Jap. Col. Nat., [1]: 263, pl. 53; 1388; INOUE, 1959, in Icon. Ins. Jap. Nat. Ed., 1: 214, pl. 151; 1; INOUE, 1977, Bull. Fac. domestic Sci., Otsuma Woman's Univ., 13: 300.

Japanese population has long been placed in subsp. *obscurior* STAUDINGER, 1897, *Dt. ent. Z., Iris*, 10: 60, from Amur, but it is distinct from both *obscurior* (Figs. 33–34) and the nominate race (Figs. 36–37) from Europe by the following characters.

Ground colour darker than nominate race, but not so dark as *obscurior*; a white spot, expansion of subterminal line, much smaller, generally inconspicuous; while in *obscurior* it is smaller than in nominate race but well defined. Generally speaking

northern specimens are paler than southern populations, but it is difficult to draw lines between populations secured from different habitats in Japan.

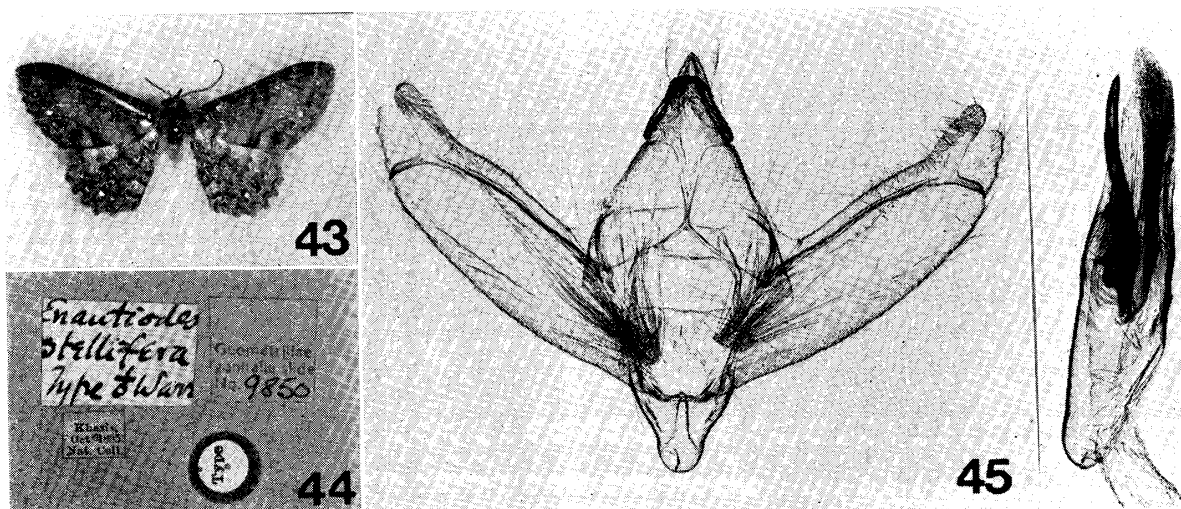
Length of forewing. ♂, 15–19 mm (54–17.4 mm), ♀, 16–18 mm (30–17.5 mm).

Male genitalia (Fig. 52). V-shaped median process of gnathos more developed than in nominate race and *obscurior*; aedeagus with two groups of spines on vesica as in nominate race (Fig. 54), while in *obscurior* (Fig. 53) dorsal one lacking.

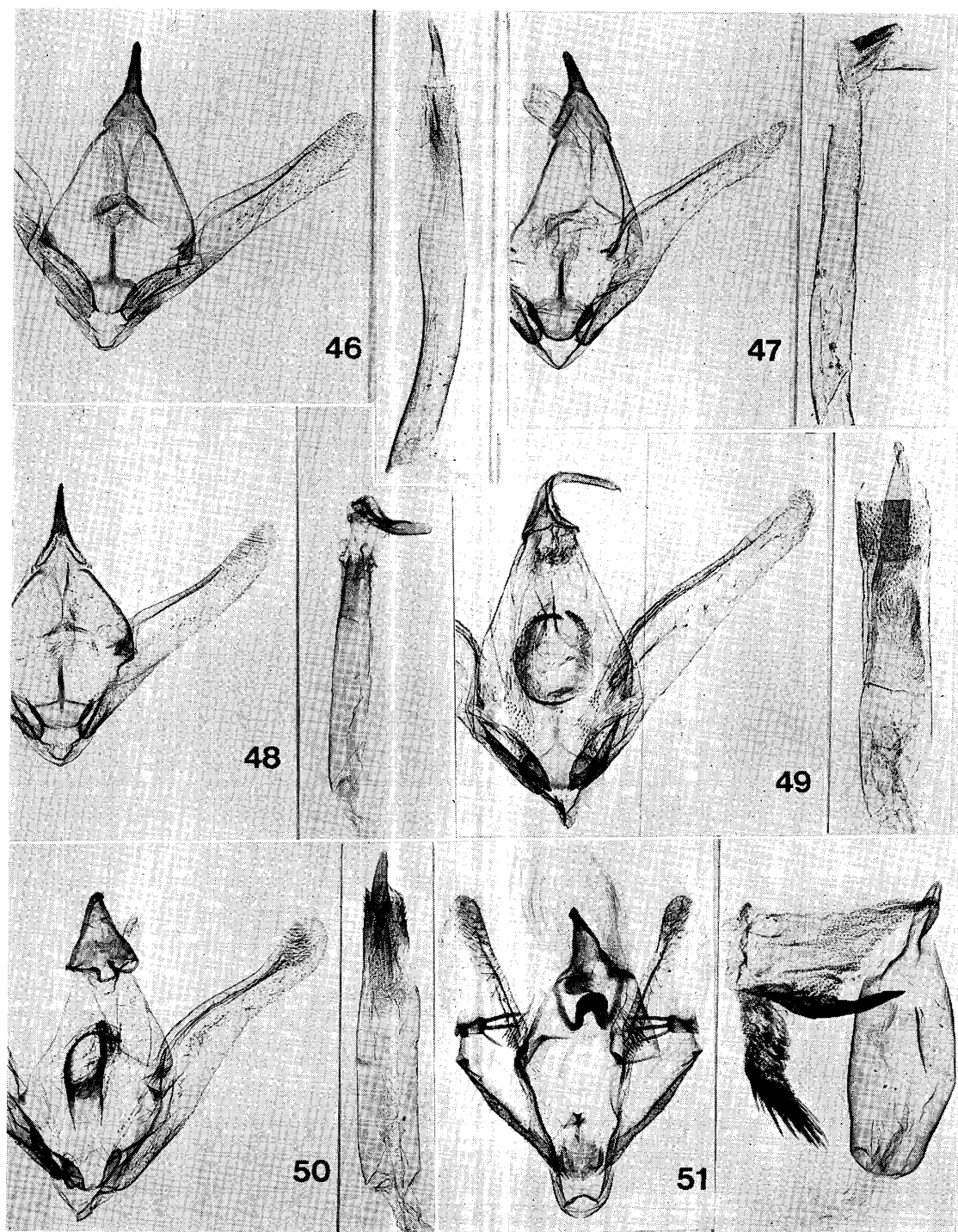
Female genitalia (Fig. 64–65). A caudal projection of lamella postvaginalis wider than high, elliptical, while in nominate race and *obscurior* higher than its basal width, tapered, with narrowly rounded apex; ductus bursae much broader than in two races (Figs. 66–68).

Holotype. ♂, Tsubame, Myôko, Niigata Pref.: 5. vii. 1975 (R. SATO).

Paratypes. Hokkaido—1 ♂, Shibeche, Kushiro, 27. vii. 1968, 1 ♂, loc. cit., 1. vii. 1978; 2 ♂, loc. cit., 6. vii. 1978; 1 ♂, loc. cit., 10. vii. 1978 (K. IJIMA); 1 ♀, Nukabira, Tokachi, 18. vi. 1964 (H. ONO), 1 ♂, loc. cit., 31. vii. 1975 (R. SATO); 1 ♀, Makubetsu, Tokachi, 17. vi. 1974 (H. KOGI); 1 ♀, Kuriyama, Ishikari, 14. vi. 1976 (H. KOGI); 1 ♀, Oiwake, Iburi, 10. vi. 1978 (H. KOGI); 1 ♀, Hakodate, 24. vi. 1970; 1 ♀, loc. cit., 8. vii. 1973 (T. INOKO). Honshu—Aomori, Pref.: 1 ♂, Amadanai, Aomori City, 6. vii. 1977 (M. KASAI); 1 ♀, Kuroishi, 9. vii. 1977 (M. KASAI). Iwate Pref.: 1 ♀, Matsukawa Spa, Hachimantai, 21. vi. 1975 (K. SATAKE); 1 ♂, Tenshōchi, Kitakami City, 2. vi. 1973 (K. SATAKE). Akita Pref.: 1 ♂, Iwawaki, Takanosu, 17. vi. 1974 (M. TAKAHASHI); 1 ♀, Yunotai, Moriyoshi, 15. vi. 1968 (M. TAKAHASHI); 1 ♀, Nibetsu, Akita City, 2. vi. 1975 (M. TAKAHASHI); 1 ♀, Sannai-Ishizawa, Honjō City, 9. vii. 1974; 1 ♀, loc. cit., 10. vii. 1975 (A. SASAKI). Gunma Pref.: 1 ♀, Doai-guchi, Minakami, 18. vi. 1968 (S. SHIMEKI); 1 ♀, Tanigawa Spa, Minakami, 6. vii. 1974 (R. SATO); 1 ♂, Mt. Azumakozan, Tsumagoi, 19. vi. 1971 (S. SHIMEKI); 1 ♂, Fujimi-mura, 20. vi. 1972 (S. SHIMEKI); 1 ♂, Mt. Mikaboyama, 30. v. 1969 (Y. SAITO); 1 ♀, Shimohino, Fujioka City, 19. vi. 1972 (H. FUSE). Saitama Pref.: 1 ♂, Niekawa, Arakawa, 22. v. 1971 (N. HIRANO). Tokyo: 2 ♂, 3 ♀, Nippara, 9. vi. 1977 (R. SATO). Niigata Pref.: 8 ♂, 2 ♀, Miomote, Asahi, 14–15. vi. 1974 (R. SATO); 10 ♂, 1 ♀, Tainai,



Figs. 43–45. *Enantiodes stellifera* WARREN. 43. ♂, holotype, Khasias, India. 44. Labels of holotype. 45. Male genitalia. Preserved in the British Museum (Natural History) collection, London. Photographs by Mr. D. S. Fletcher.



Figs. 46-51. Male genitalia. 46. *Ectropis bistortata* (GÖEZE), Form A. Slide RS-245.
 47. *E. bistortata* (GÖEZE), Form B. Slide RS-239. 48. *E. obliqua* PROUT. Slide RS-241.
 49. *E. excellens* (BUTLER). Slide RS-1109. 50. *E. aigneri* PROUT. Slide RS-1115.
 51. *Paradarisa consonaria* (HÜBNER). Slide RS-1046.

Kurokawa, 26. vi. 1971 (R. SATO & S. SAKURAI); 1 ♂, Akadani, Shibata, 18. vi. 1968 (R. SATO); 4 ♂, Sakasamaki, Tsunan, 10. vi. 1961 (H. MURAKI); 1 ♀, same data as holotype; 1 ♂, type locality, 28. vii. 1977 (R. SATO); 1 ♀, Seki, Sotokaifu, Is. Sado, 22. vii. 1963 (R. SATO). Yamanashi Pref.: 1 ♂, Sanjô, Tabayama, 29. v. 1977 (R.

SATO); 1 ♂, loc. cit., 11. vi. 1977 (K. YAZAKI); 1 ♂, Fukashiro, 22. v. 1976 (K. YAZAKI). Nagano Pref.: 2 ♂, 1 ♀, Tôge-machi, Karuizawa, 10. vi. 1978 (R. SATO); 1 ♂, Lake Aokiko, 2. vii. 1972 (M. TOMONAGA); 1 ♂, Yunomaru, 2. vii. 1977 (R. SATO). Gifu Pref.: 2 ♂, 2 ♀, Hindani, Tokuyama, 21. v. 1977 (N. BITO). Hyôgo Pref.: 1 ♂, Onzui, Haga, 2. vi. 1978 (S. KINOSHITA). Shikoku—Tokushima Pref.: 1 ♂, Mikoshi, Mt. Tsurugi, 10. vi. 1978 (T. MASUI). Kyushu—Kumamoto Pref.: 1 ♂, 1 ♀, Kikuchisuigen, 29. vi. 1978 (I. OTSUKA); 1 ♀, Fukaba, Aso, 7. vii. 1975 (I. OTSUKA); 1 ♂, Mt. Shiratori, Izumi, 17. viii. 1976; 2 ♀, loc. cit., 8. vii. 1978 (I. OTSUKA).

Holotype and five paratypes will be deposited to the collection of the National Science Museum, Tokyo. Other paratypes are in my cabinet.

Distribution. Hokkaido, Honshu, Shikoku, Kyushu. Nominate subsp.: Europe. Subsp. *grisescens* (DJAKONOV): S. Siberia. Subsp. *obscurior* (STAUDINGER): Amur, Ussuri, Korea (new record).

First instar larva. Pigmental pattern quite distinct from *Ectropis*, agreeing with "Boarmia-type". Extra seta SDX1 absent.

Mature larva. Body finely granulate; seta D1 on A8 flush with skin; D2 on A5 borne on a small tubercle; extra seta SDX1 absent; L2 on A1 well anterior to spiracle (SATO, 1979a).

Food plants. *Chamaecyparis obtusa* (Cupressaceae), *Carpinus cordata*, *Betula ermani*, *B. platyphylla* var. *japonica* (Betulaceae), *Quercus mongolica* var. *grosseserrata* (Fagaceae). In Europe the nominate subspecies is found on *Quercus*, *Betula*, *Alnus*, *Fagus*, *Carpinus*, *Corylus* etc. Univoltine. Hibernation in pupal stage.

Remarks. Korean specimens are identical with ssp. *obscurior* in appearance and genital characters. Subspecies *grisescens* (DJAKONOV), 1926, *Jahrb. Martjanov. Staatsm.*, 4: 74, from Minussinsk in S. Siberia, with both wings much paler, not tinged with brown, a white spot being almost vanished (Fig. 35). Female genitalia of *grisescens* similar to the nominate race (Fig. 66); male genitalia not examined.

Material of other subspecies. Nominate subsp.—England: 3 ♂, 3 ♀ from Southampton, Newbury, Burntwood and Tirny. Subsp. *grisescens*—USSR: 2 ♀, Krasnojarsk, 250 km north of Minussinsk, S. Siberia, 6. vii. 1972 (J. VIIDALEPP). Subsp. *obscurior*—USSR: 1 ♂, 1 ♀, Kedrovaja, S. Ussuri, 1–5. vi. 1974; 1 ♀, loc. cit., 13–15. vi. 1974; 1 ♂, Nelma, Habarovsk, 16–26. vii. 1977 (J. VIIDALEPP). Korea: 1 ♂, Jilisan, 13. vi. 1957; 3 ♂, Kwangnung, 11–16. vi. 1958; 1 ♀, Changyangri, 2. vi. 1958; 1 ♂, Paiktamsa, Mt. Sulaksan, 29. vi. 1969; 1 ♀, Towangseongpokpo, Mt. Sulaksan, 6. vii. 1979 (S. W. PAK).

Protalcis gen. nov.

Type-species: *Boarmia concinnata* WILEMAN.

Male. Front flat. Proboscis developed. Palpus slightly upturned, just attaining front. Antenna similar to *Ectropis* (Fig. 6). Third abdominal sternite without cluster of spines. Hind tibia without hair-pencil. Forewing with a fovea; 11-veined, vein R_2 entirely coincident with R_1 ; R_1 free from Sc, arising from before upper angle of cell (Fig. 11).

Female. Both wings brachypterous (Fig. 40). Antenna ciliate. Proboscis shorter than in male. Vein R_1 approximating to Sc, sometimes anastomosing with it.

Male genitalia (Fig. 56). Uncus with broad base, bifurcate apically. Gnathos developed with hooked-tip. Valva with a hairy ampulla, triangular ventral process from its base. Juxta with broad base, posteriorly sharply narrowing, bifid dorsally. Aedeagus with slender, elongate, sclerotized projection posteriorly, and with two cornuti on vesica, one strongly-curved, horn-like, and the other small patch.

Female genitalia (Fig. 69). Ovipositor long. Sterigma membranous, without lateral areas more or less sclerotized. Ductus seminalis arising from right side near posterior end of bursa copulatrix. Bursa copulatrix slender, posterior one-fourth sclerotized, at only left side near ostium. Signum large, fold in shape.

The structure of genitalia suggests that this new genus is considerably related to *Alcis*. But it is quite distinct from *Alcis* mainly as follows: juxta without a pair of processes arising from dorsal end; the single large folded signum; male antenna fasciculate; forewing 11-veined, R_2 coincident with R_1 ; female wings brachypterous.

This new genus is represented only by the type-species.

***Protalcis concinnata* (WILEMAN) comb. nov.**

(Figs. 38–40)

Boarmia concinnata WILEMAN, 1911, Trans. ent. Soc. Lond., **1911**: 312; PROUT, 1915, in SEITZ, Macrolep., **4**: 378.

Boarmia interrupta WILEMAN, 1911, Trans. ent. Soc. Lond., **1911**: 313, pl. 30: 2.

Boarmia concinnata ab(?) *interrupta*: PROUT, 1915, in SEITZ, Macrolep., **4**: 378, pl. 21: h.

Boarmia (Ectropis) concinnata: WEHRLI, 1943, in SEITZ, Macrolep., Suppl. **4**: 537.

Boarmia (Ectropis) concinnata sutschania WEHRLI, 1953, in SEITZ, Macrolep., Suppl. **4**: 537, pl. 45: i.

Ectropis concinnata: INOUE, 1956, Check List Lep. Jap., **3**: 331; INOUE, 1957, in Icones Het. Jap. Col. Nat., [1]: 263; INOUE, 1959, in Icon. Ins. Jap. Col. Nat. Ed., **1**: 213, pl. 150: 5b; INOUE, 1961, Japan Heterocerists' J., (24): 87, figs. 3–6; INOUE, 1977, Bull. Fac. domestic Sci., Otsuma Woman's Univ., **13**: 300.

Ectropis concinnata interrupta: INOUE, 1956, Check List Lep. Jap., **3**: 331; INOUE, 1957, in Icones Het. Jap. Col. Nat., [1]: 263, pl. 53: 1385; INOUE, 1959, in Icon. Ins. Jap. Col. Nat. Ed., **1**: 213, pl. 150: 5a; INOUE, 1961, Japan Heterocerists' J., (24): 87, figs. 1–2.

This species has long been placed in *Ectropis*, but is quite distinct from it in the structure of genitalia, as described for the genus, and in larval characters. As Honshu population is slightly darker with less defined pattern, it has been separated from the nominate race of Hokkaido as subsp. *interrupta* WILEMAN. Unstablens of colour and intensity of maculation within a population makes geographical races ambiguous.

Length of forewing. ♂, 18–21 mm (12–19.0 mm), ♀, 10–12 mm (2–11.0 mm).

Male genitalia (Fig. 56). As described for the genus.

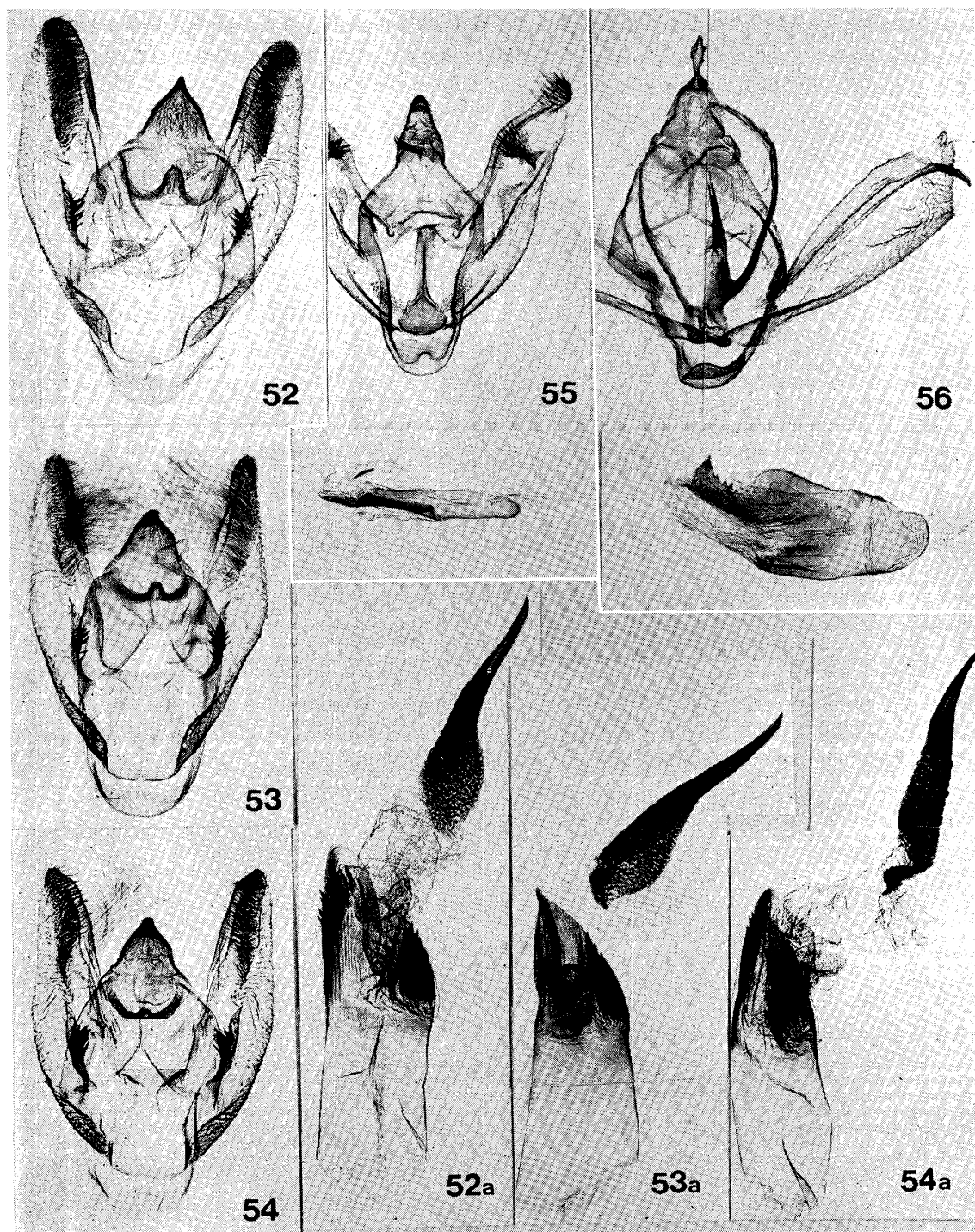
Female genitalia (Fig. 69). As described for the genus.

Material examined. 16 ♂, 19 ♀. Hokkaido—Shibecha, Kushiro (vi.); Atsuma Iburi (v). Honshu—Gunma Pref.: Kumanotaira (iv); Numata (iv). Yamanashi Pref.: Uenohara (ii); Fukushima (iii); Nirasaki (iii). Nagano Pref.: Shirohebisawa, Ueda (iii, iv); *loc. cit.*, ex larvae (v, emerged); Kisofukushima (iv).

Distribution. Hokkaido, Honshu: Ussuri.

First instar larva. Pigmental pattern quite distinct from *Ectropis*, agreeing with “*Boarmia*-type”. Extra seta SDX1 absent (SATO, 1979a).

Mature larva. Body closely granulate; seta D1 on A8 borne on a small tubercle; extra seta SDX1 absent; L2 on A1 well anterior to spiracle (SATO, 1979b).



Figs. 52–56. Male genitalia. a: aedeagus. 52. *Parectropis extersaria japonica* ssp. nov. Slide RS-263. 53. *P. extersaria obscurior* (STAUDINGER). Slide RS-1061. 54. *P. extersaria extersaria* (HÜBNER). Slide RS-917. 55. *Protalcis concinnata* (WILEMAN). Slide RS-331. 56. *Abaciscus albipunctata* (INOUE). Slide RS-264.

Food plants. *Malus pumila* var. *dulcissima* (Rosaceae). *Parabenzoin praecox* (Lauraceae). Larvae from eggs laid by one female taken at Shirohebisawa, Ueda, Nagano Pref. by Mr. H. MIYASAKA, were reared on the following plants: *Quercus mongolica* var. *grosseserrata* (Fagaceae), *Prunus grayana*, *P. yedoensis*, *Pourthiaea*

villosa (Rosaceae), *Corylus sieboldiana* (Betulaceae), *Hamamelis japonica* var. *obtusata* (Hamamelidaceae). Probably polyphagous. A univoltine spring moth. Hibernation in pupal stage.

Genus *Abaciscus* BUTLER

Abaciscus BUTLER, 1889, Ill. Het. Coll. Brit. Mus., 7: 102. Type-species: *Abaciscus tristis* BUTLER.

Up to the present any species of *Abaciscus* has not been recorded from Japan. *Albipunctata* was described from Japan as a new species of *Ectropis* by INOUE (1955). In larval characters *albipunctata* is distinct from any other boarmid genera, not to mention *Ectropis* (SATO, 1979b). The structure of genitalia shows that it is a typical member of *Abaciscus*.

Abaciscus albipunctata (INOUE) **comb. nov** (Figs. 41–42)

Ectropis albipunctata INOUE, 1955, Tinea, 2: 86, pl. 7: 10; INOUE, 1956, Check List Lep. Jap., 3: 332; INOUE, 1957, in Icones. Het. Jap. Col. Nat., [1]: 263, pl. 53: 1389; INOUE, 1959, in Icon. Ins. Jap. Col. Nat. Ed., 1: 214, pl. 151: 2; INOUE, 1977, Bull. Fac. domestic Sci., Otsuma Woman's Univ., 13: 300.

Male antenna, similar to *Ectropis* but the shape of each segment different from it, as shown in figs. 1, 2 and 5. In male third abdominal sternite with cluster of spines; hind tibia with hair-pencil. Forewing without fovea; variable in subcostal and radial veins; R_1 arising from Sc, often anastomosing with R_2 ; sometimes R_1 free from Sc, long-stalked with R_2 ; R_2 from cell or R_1 , sometimes from Sc. Ground colour fuscous brown with weakly defined lines and with a subterminal white spot on each wing.

Length of forewing. Vernal brood, ♂, 13–16 mm (6–14.7 mm), ♀, 14–16 mm (4–14.8 mm); aestival brood, ♂, 12–15 mm (4–13.5 mm), ♀, 13–15 mm (6–13.7 mm).

Male genitalia (Fig. 56). Similar to *tristis*, but distinct from it as follows: uncus with a wedge-like projection; a pair of process from juxta much slenderer, asymmetrical, left one forked, and its left arm about 1.5 times as long as right one; aedeagus with many short thorn-like cornuti.

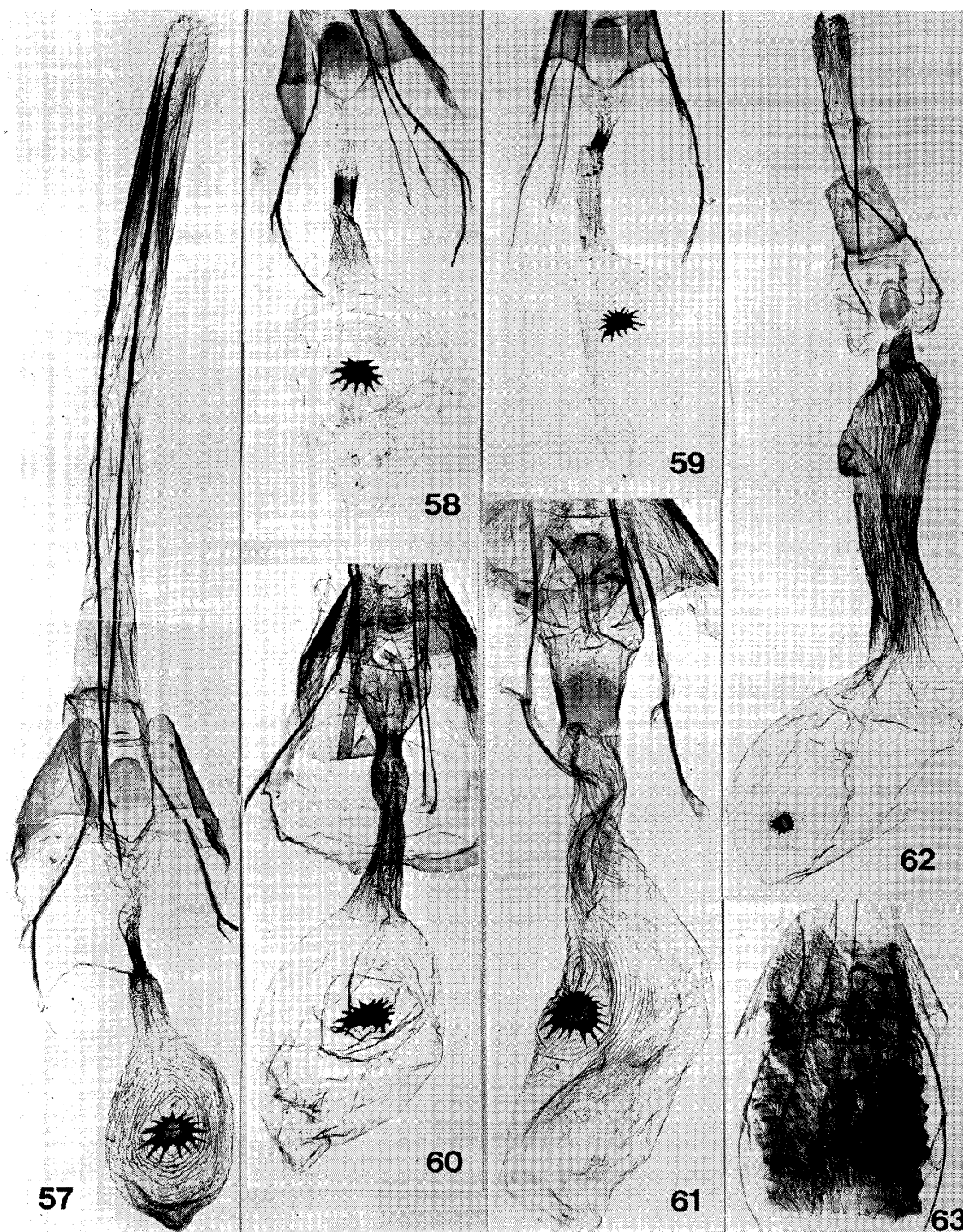
Female genitalia (Fig. 70). Similar to *tristis*, but distinct from it as follows: lamella postvaginalis with cephalical margin almost straight, not concave medially as in *tristis*; ductus bursae much broader.

Material examined. 10 ♂, 10 ♀. Honshu—Tokyo: Nippara (vi). Niigata Pref.: Miomote (vi); Tainai (vi, viii); Akadani (viii); Shimodaira, Kanose (viii); Tochio (vii); Mt. Atema (vi); Mt. Ômine (viii); Tsubame (vi, vii); Okayama, Myôko (vii). Yamanashi Pref.: Sanjô, Tabayama (v). Wakayama Pref.: Ôsugidani (viii). Okayama Pref.: Mt. Hiruzen (vii).

Distribution. Honshu, Shikoku, Kyushu.

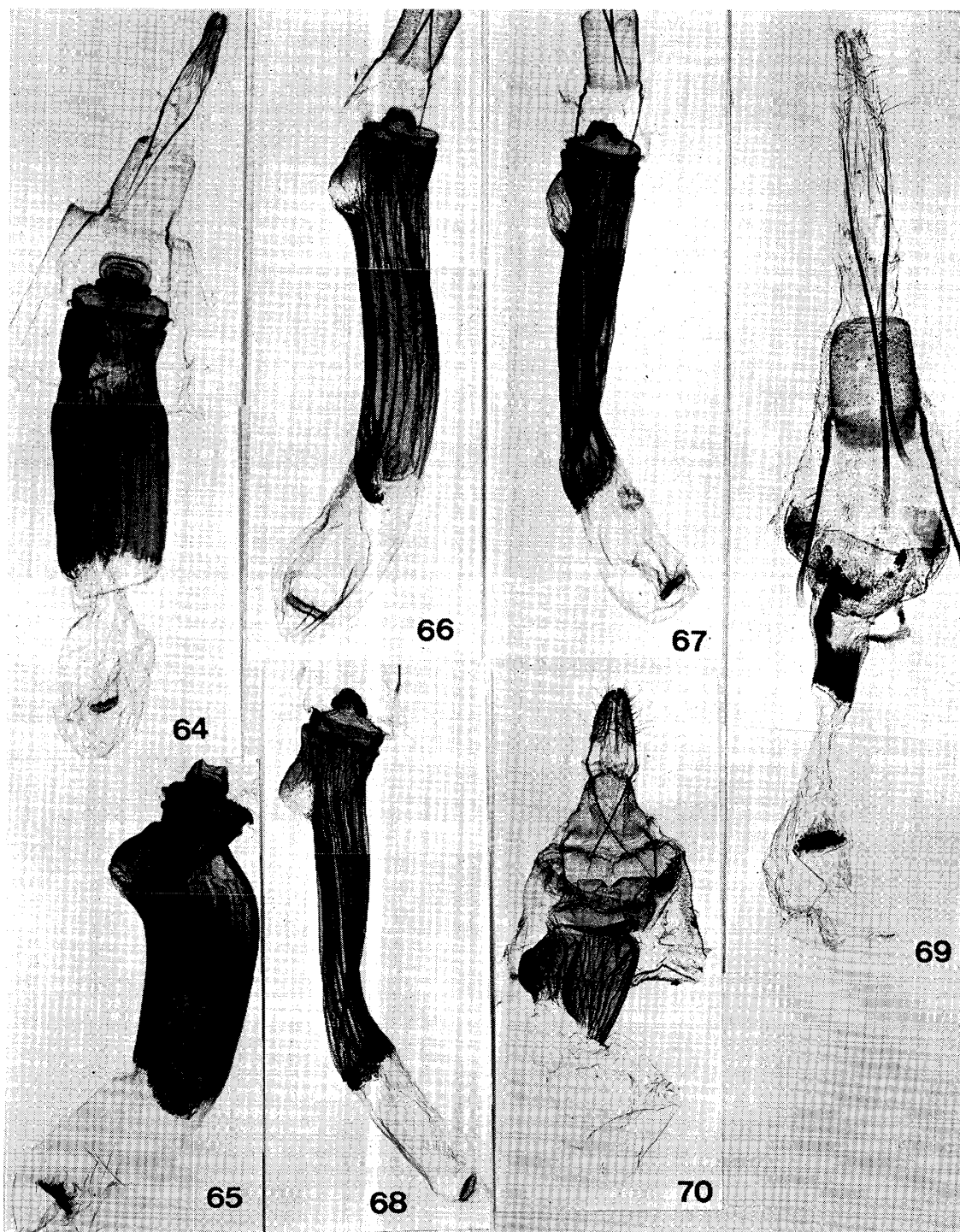
First instar larva. Pigmental pattern is neither “*Ectropis*-type” nor “*Boarmia*-type”, as follows: head and body pale milky white, without marking. Extra seta SDX1 absent (SATO, 1979b).

Mature larva. Distinct from not only *Ectropis* but also any other boarmid genera mainly as follows: head large, nearly as wide as high; coronal suture very long, about



Figs. 57–63. Female genitalia. 57. *Ectropis bistortata* (GOEZE), Form A. Slide RS-626. 58. *E. bistortata* (GOEZE), Form B. Slide RS-249. 59. *E. obliqua* Prout. Slide RS-1117. 60. *E. aigneri* PROUT. Slide RS-383. 61. *E. excellens* (BUTLER). Slide RS-251. 62. *Paradarisa consonaria* (HÜBNER). Slide RS-1045. 63. *Ectropis excellens* (BUTLER), long hairs of 9th abdominal segment. Slide RS-695.

2.5 times as long as height of fornt; seta M1 on labrum minute; mandible with internal tooth; extra seta SDX1 lacking; seta L2 on A1 distinctly anterior to spiracle (SATO, 1979b).



Figs. 64–70. Female genitalia. 64. *Parectropis extersaria japonica* ssp. nov. Slide RS-395. 65. Ditto. Slide RS-919. 66. *P. extersaria grisescens* (DJAKONOV). Slide RS-1064. 67. *P. extersaria obscurior* (STAUDINGER). Slide RS-1062. 68. *P. extersaria extersaria* (HÜBNER). Slide RS-1068. 69. *Protalcis concinnata* (WILEMAN). Slide RS-1091. 70. *Abaciscus albipunctata* (INOUE). Slide RS-269.

Food plant unknown, but larvae hatched from eggs laid by captured females taken at Tainai, Niigata Pref. by me were successfully reared on *Fagus crenata* (Fagaceae). The larvae refused to eat other plants, e. g. *Quercus*, *Prunus*, *Acer*, *Salix*,

Betula spp. Probably monophagous. Bivoltine. Hibernation probably in pupal stage.

Remarks. In appearance this species is much more similar to *A. alishanensis* INOUE, 1978, *Bull. Fac. domestic Sci., Otsuma Woman's Univ.*, **14**: 246, and *A. intractabilis* (WALKER), 1864, *J. Linn. Soc. Zool.*, **7**: 83, both from Taiwan, than to *A. tristis* BUTLER, 1889, *Ill. Het. Coll. Brit. Mus.*, **7**: 102. *Enantiodes stellifera* WARREN, 1896, *Novit. zool.*, **3**: 133, from Khasias in India (Figs. 43–44), type-species of the genus, is very similar to *Abaciscus* in male genitalia, especially in ampulla at the apex of costa produced into a spine, and different from it only by absence of process from juxta (Fig. 45). Appearance also supports a close relationship between the two genera.

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(Asterisk indicates the references cited indirectly.)

摘 要

従来 *Ectropis* 属として扱われていた日本産 8 種のエダシャクについて、成虫幼虫の形態に基づいて再検討した。

属 *Ectropis* は、模式種 *crepuscularia* DENIS et SCHIFFERMÜLLER とその近縁種に限定して使用するべきであり、それらは成虫幼虫共に極めて等質的な形質をそなえている。日本産 8 種のうち次の 4 種が真の *Ectropis* のメンバーであり、残りの 4 種は、2 新属を含む 4 属にそれぞれ移行する措置をとった。

Ectropis bistortata (GOEZE) フトフタオビエダシャク

針葉樹 (スギ) に固有の一型 (Form B) があり、多食性の Form A と幼虫形態では容易に区別できるが、成虫では安定した区別点が見出されないため現段階では同一種として扱った。

Ectropis obliqua PROUT ウスジロエダシャク

Ectropis excellens (BUTLER) オオトビスジエダシャク

Ectropis aignerii PROUT ウストビスジエダシャク

Paradarisa consonaria (HÜBNER) シナトビスジエダシャク

雌雄交尾器の形態が、属の模式種 *P. comparataria* WALKER によく似ている。本属については最近筆者 (1980, 蛾類通信, (106): 85–89) が別に報告した。

Parectropis SATO (新属): 模式種は *Geometra extersaria* HÜBNER.

P. extersaria japonica SATO シロモンキエダシャク

従来日本の個体群は、亜種 *obscurior* STAUDINGER (アムール・ウスリー・朝鮮) として扱われていたが、原名亜種 (ヨーロッパ) や亜種 *grisescens* DJAKONOV (シベリア) を含めての再検討の結果、外観はもとより雌雄交尾器の形態にも差異が認められたので別亜種として記載した。

Protalcis SATO (新属): 模式種は次種。

P. concinnata (WILEMAN) トギレエダシャク

雌の翅は痕跡的。交尾器や幼虫の形態は、*Alcis* 属との関連を示唆しているが、系統関係ははっきりしない。

Abaciscus albipunctata (INOUE) シロテントビスジエダシャク

交尾器形態は属の模式種 *A. tristis* BUTLER に類似している。成虫幼虫共に極めて特異な形質をそなえており、本属の分類上の位置は必ずしも明白ではない。本種はおそらくブナに固有。

なお以上 8 種の幼虫については、筆者の最近の報告も参照されたい (1979a, *Tinea*, **10**: 253–266; 1979b, 越佐昆虫同好会々報, (50): 67–74)。